

# Conference on Green Building, The Economy, and Public Policy

*Berkeley, California  
December 2, 2009*

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*Does Anyone See A Problem With This Picture?*



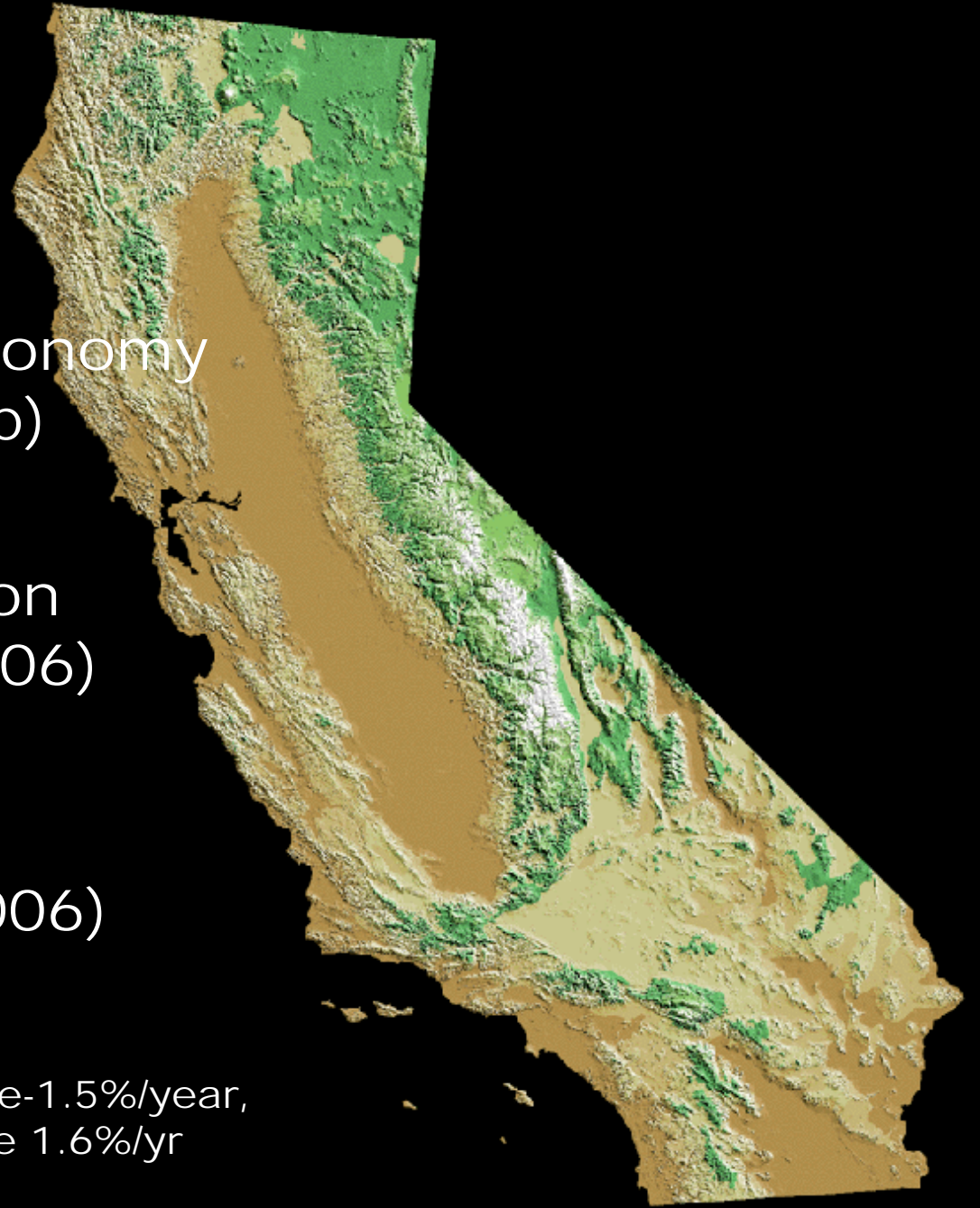
# California

10<sup>th</sup> Largest World Economy  
\$1.5 Trillion (2004-ppp)

Energy Consumption  
~295,000 GWh (2006)

Peak Demand  
~64,000 MW (2006)

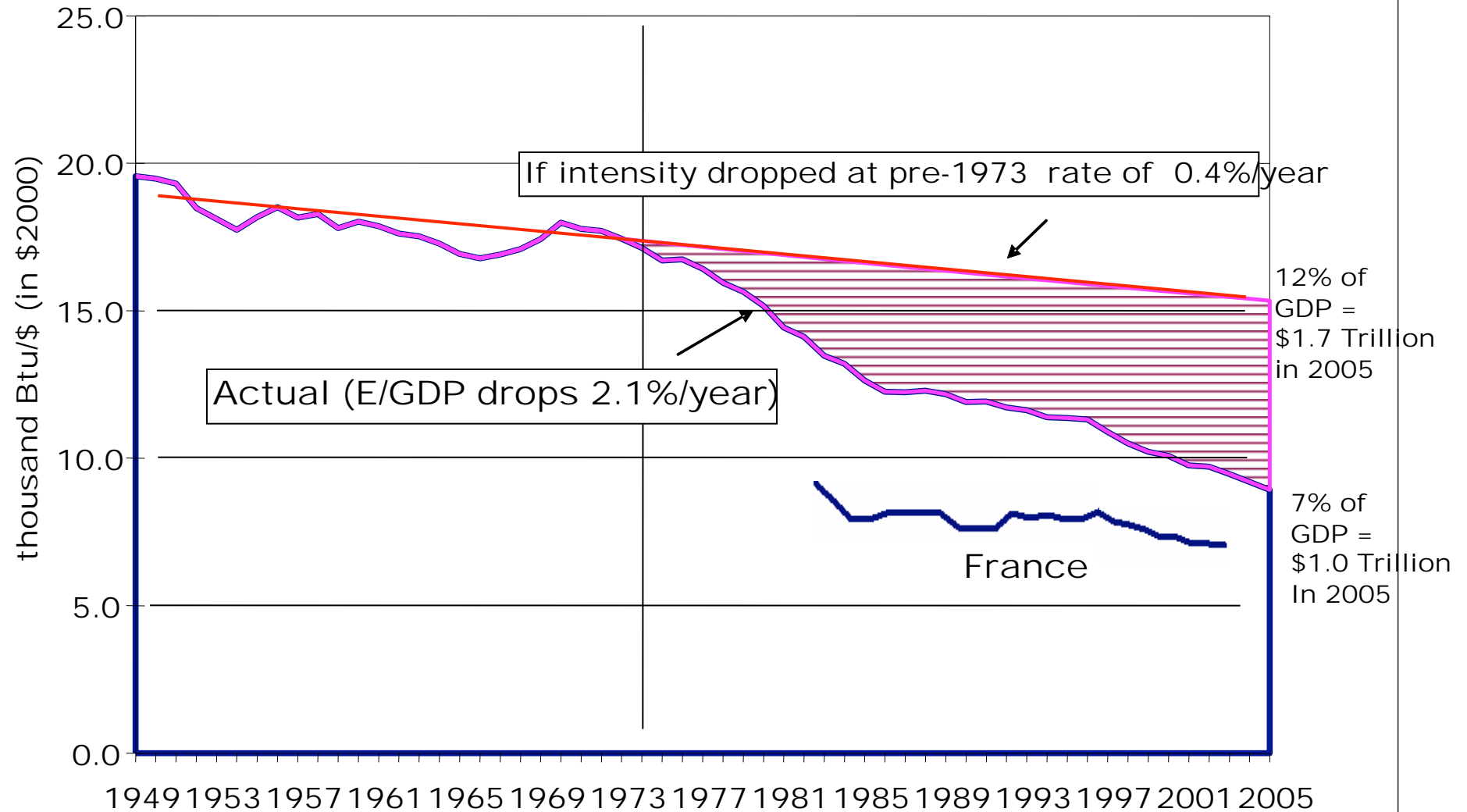
Population-35 million; growth rate-1.5%/year,  
Electricity growth for last decade 1.6%/yr



Abatement cost <\$50/ton

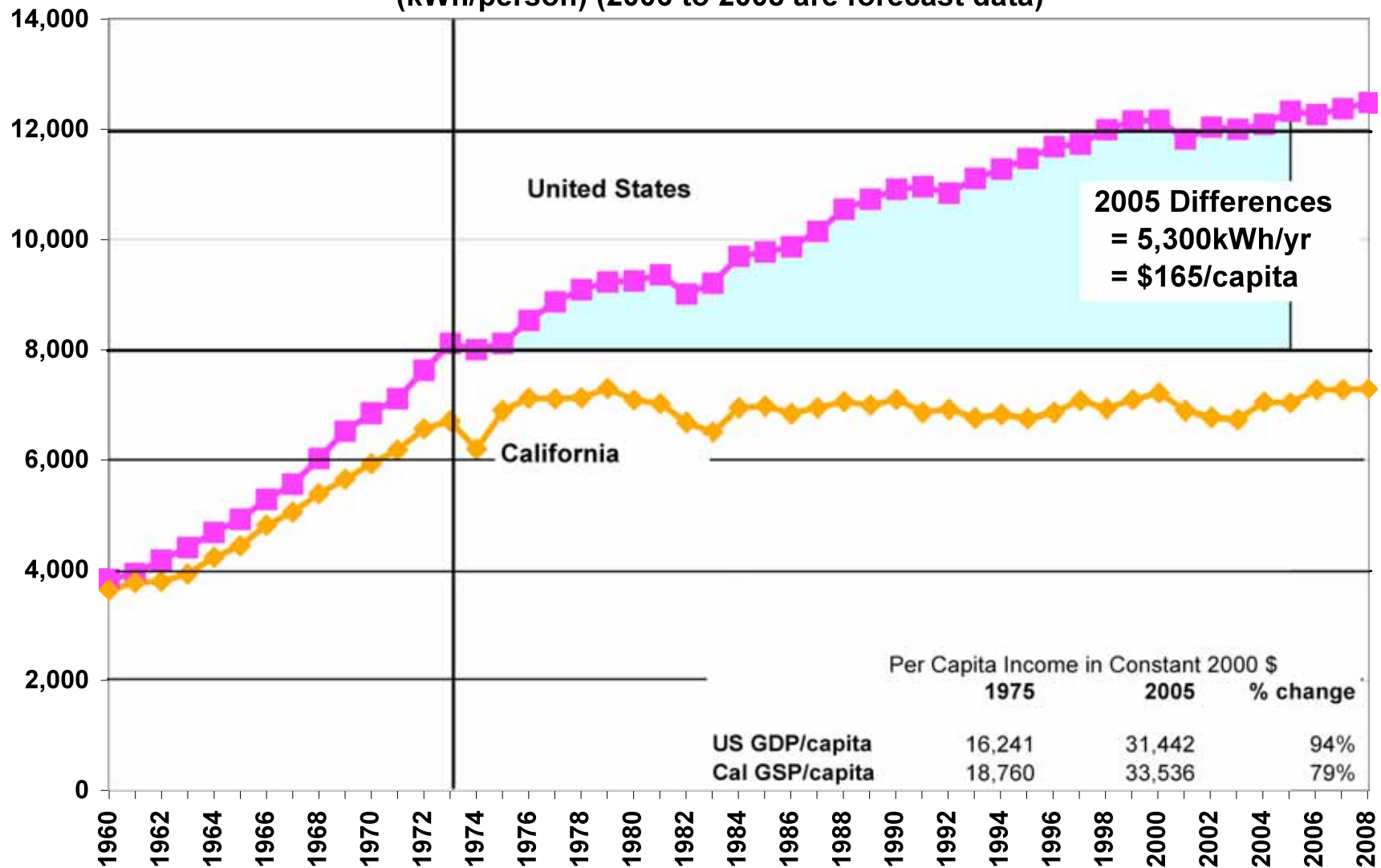


# Energy Intensity (E/GDP) in the United States (1949 - 2005) and France (1980 - 2003)

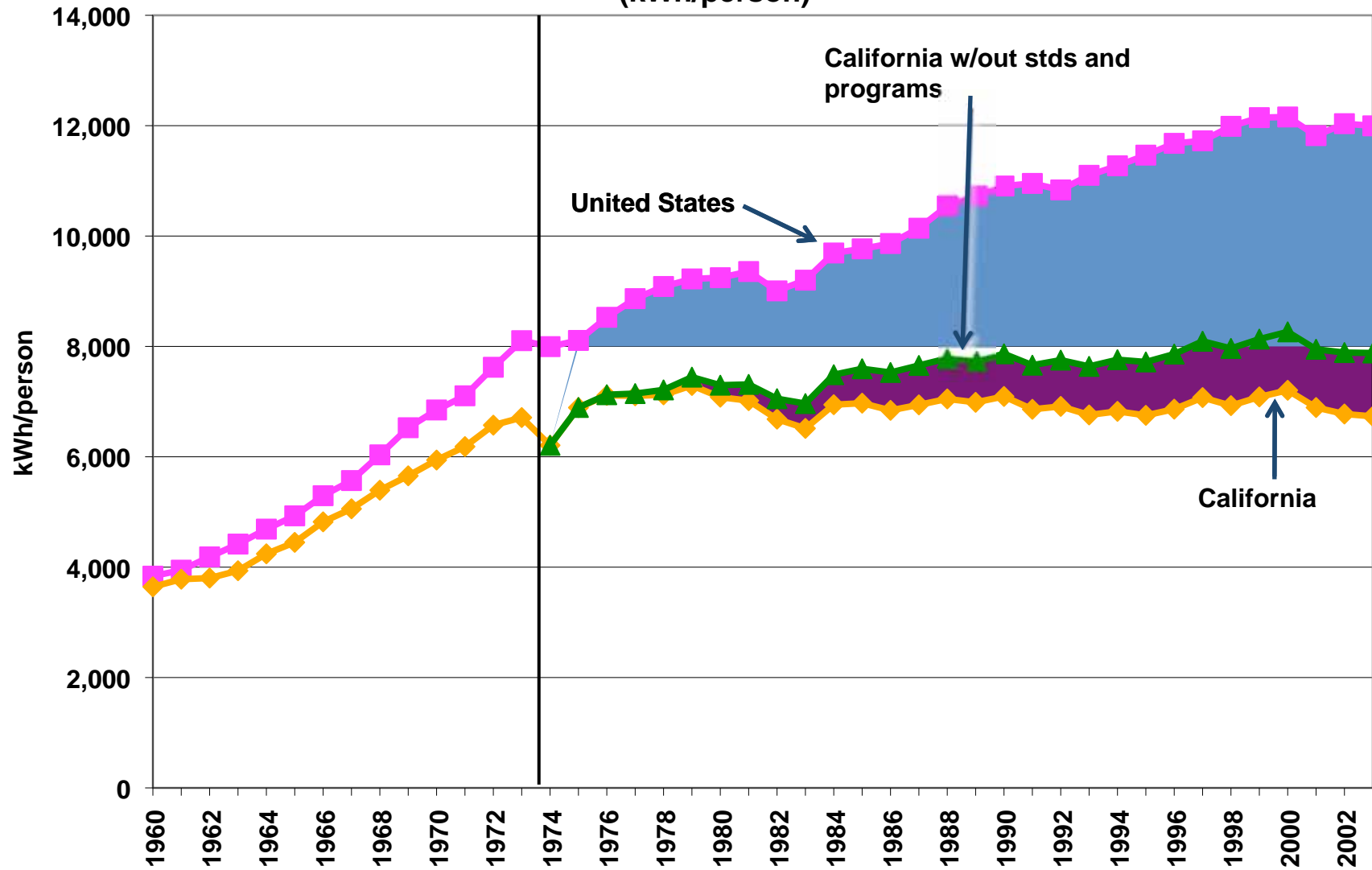




**Per Capita Electricity Sales (not including self-generation)  
(kWh/person) (2006 to 2008 are forecast data)**

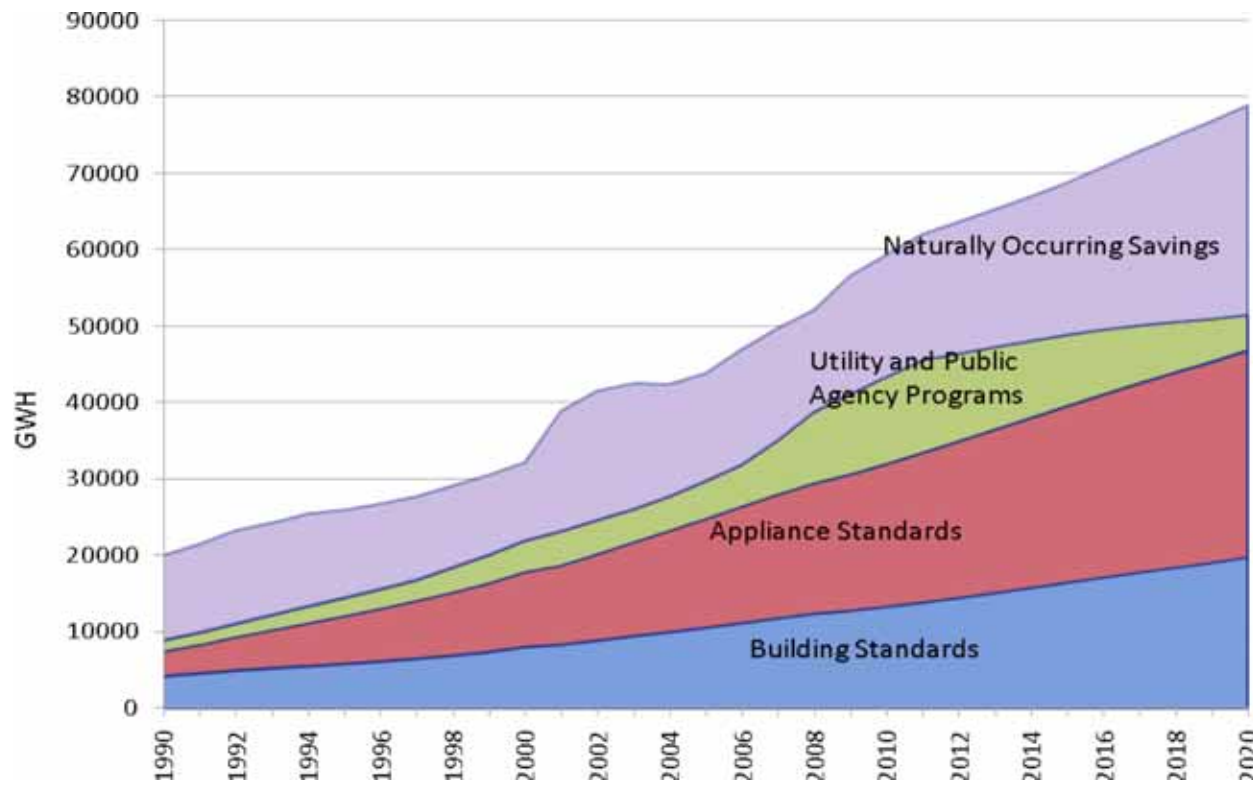


**Per Capita Electricity Sales (not including self-generation)  
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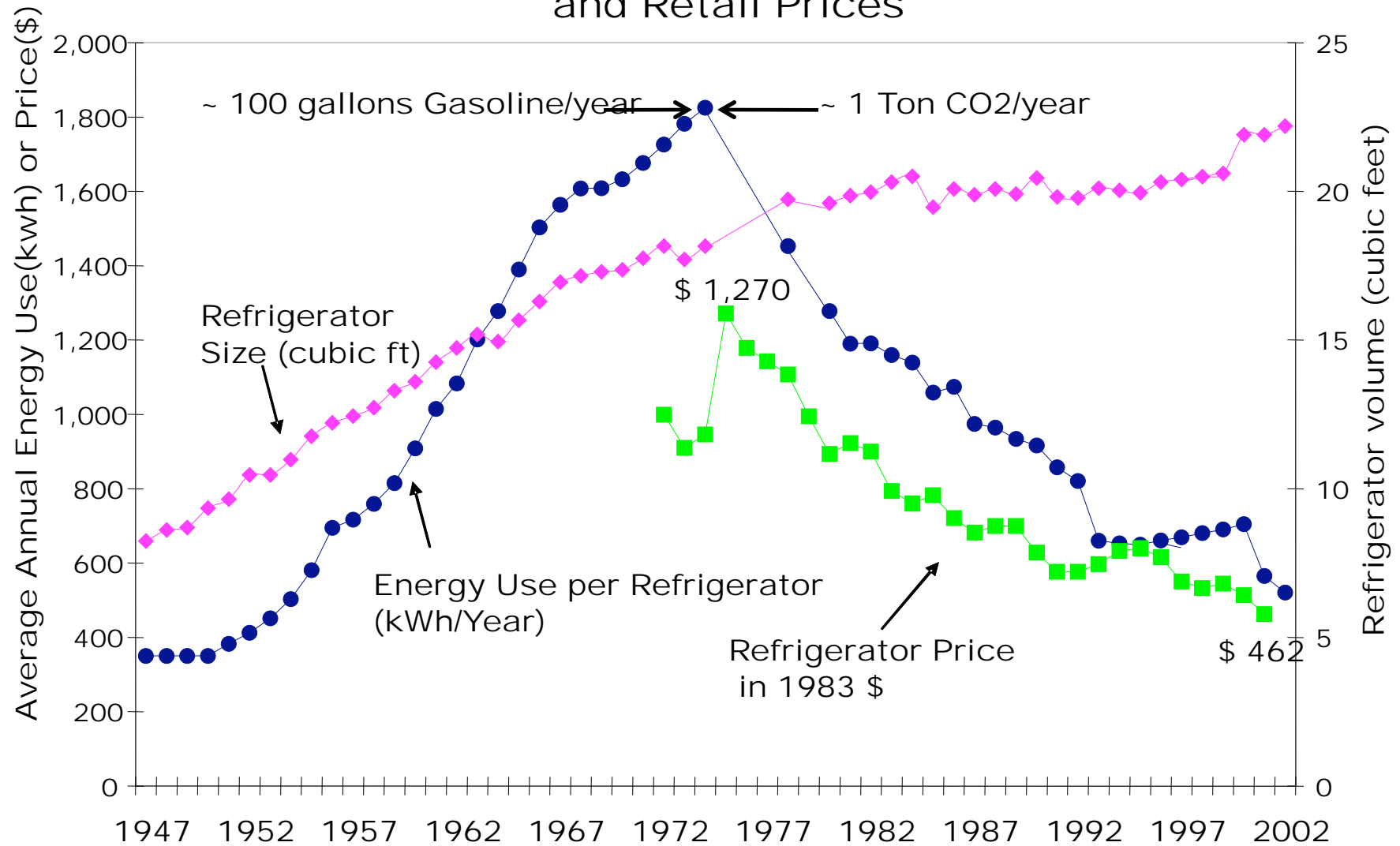
# Impact of Appliance Efficiency Regulations

In 2009, approximately 31% (17,896 GWh) of California's energy savings are achieved through appliance efficiency standards. This saves \$2.5 billion in electrical bills annually. [2009 *Integrated Energy Policy Report*]



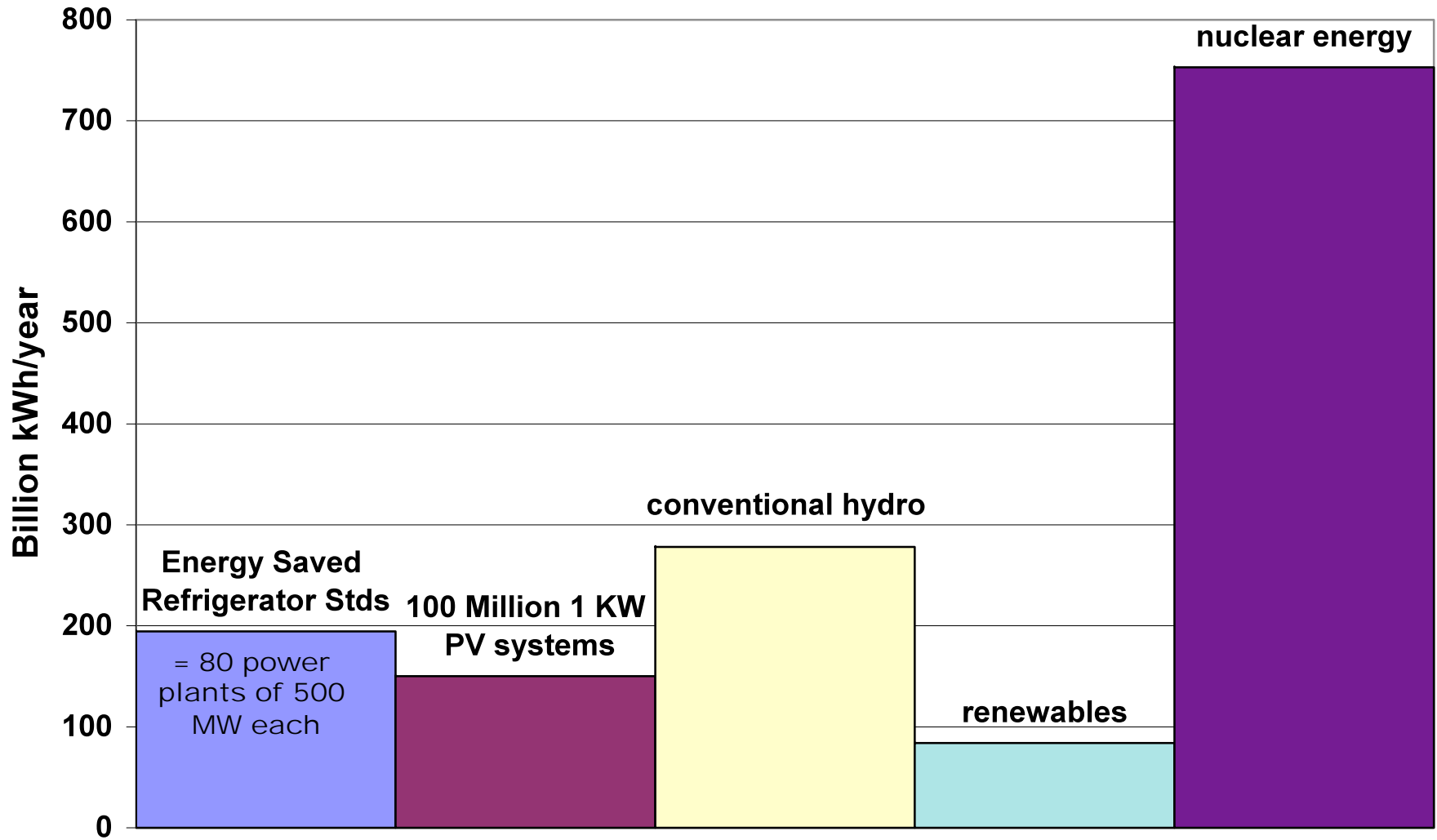


# New United States Refrigerator Use v. Time and Retail Prices



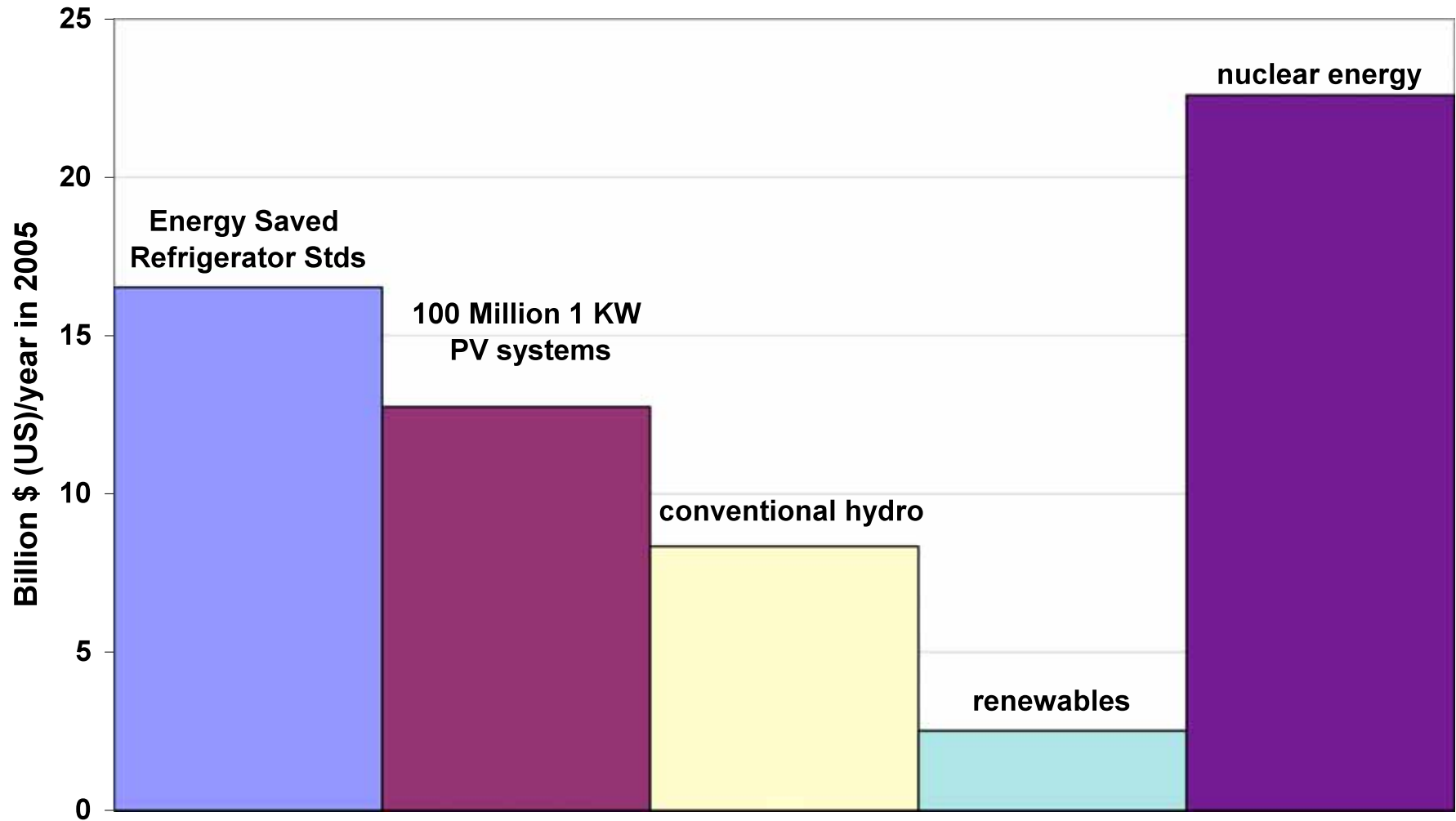
Source: David Goldstein

## Annual Energy Saved vs. Several Sources of Supply In the United States



In the United States

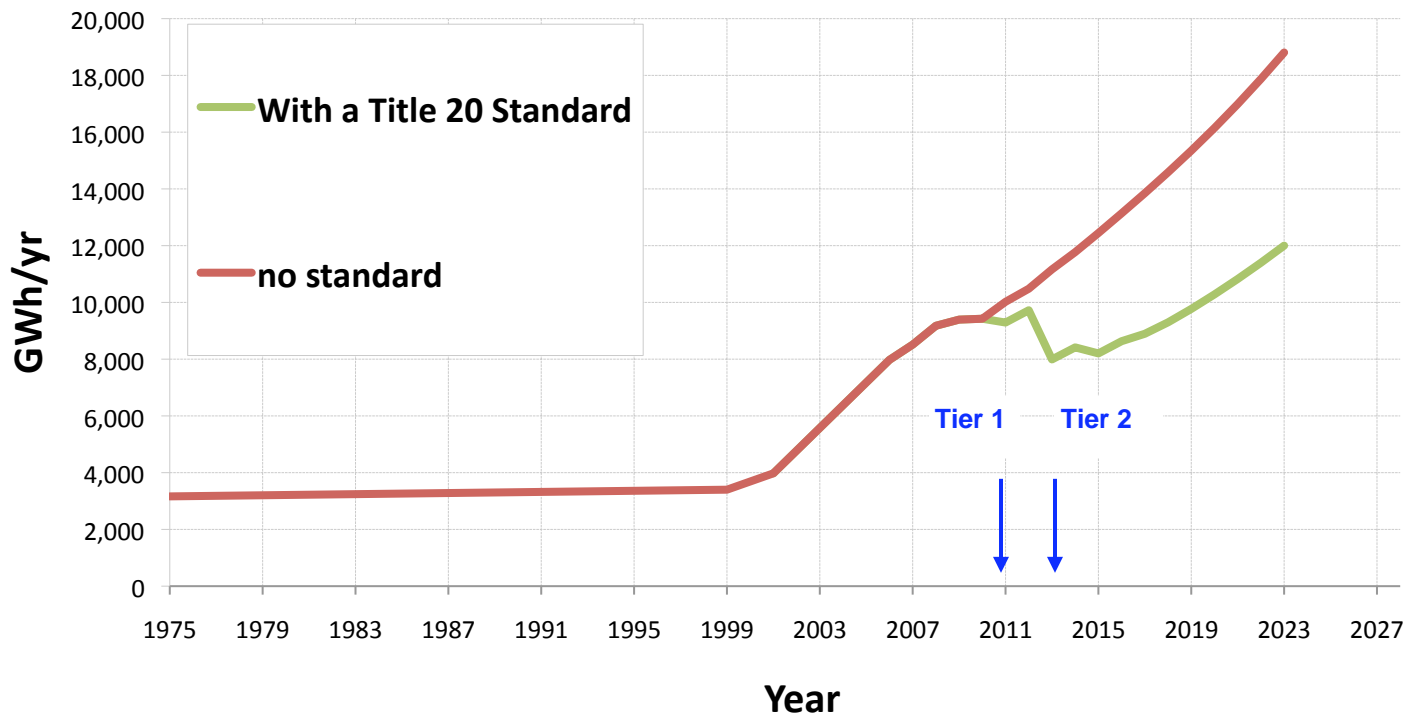
**Value of Energy to be Saved (at 8.5 cents/kWh, retail price) vs.  
Several Sources of Supply in 2005 (at 3 cents/kWh, wholesale price)**



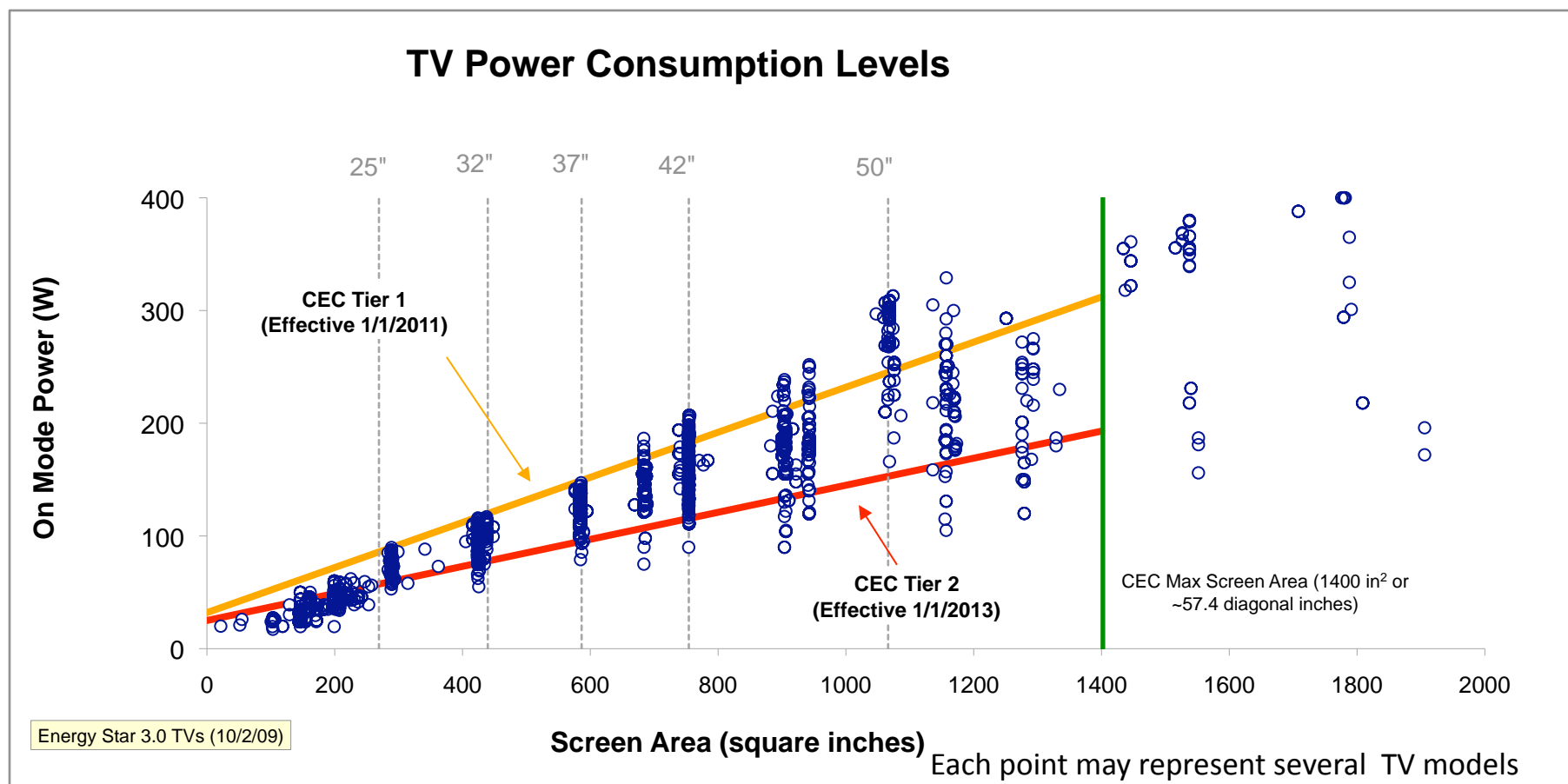
# Televisions Represent Significant Energy Use

The residential energy consumption due to televisions rapidly **increased from 3-4% in 1990s to 8-10% in 2008**. Television energy will grow up to 18% by 2023 without regulations. The projected growth does not include the residential energy use by cable boxes, DVD players, internet boxes, Blue Ray, game consoles etc.

**California Energy Consumption from TVs  
(Forecast with and without proposed standards)**



# Technically Feasible Standards



\*Consumers can expect to save between \$ 50 - \$ 250 over the life of their TV

\*A 50 inch plasma can consume as little as 307 kWh/yr and as much as 903 kWh/yr

# General Purpose Lighting – Proposed Regulations (cont.)

**Proposed Table K-8: Standards for State-regulated General Services Incandescent Lamps -Tier I**

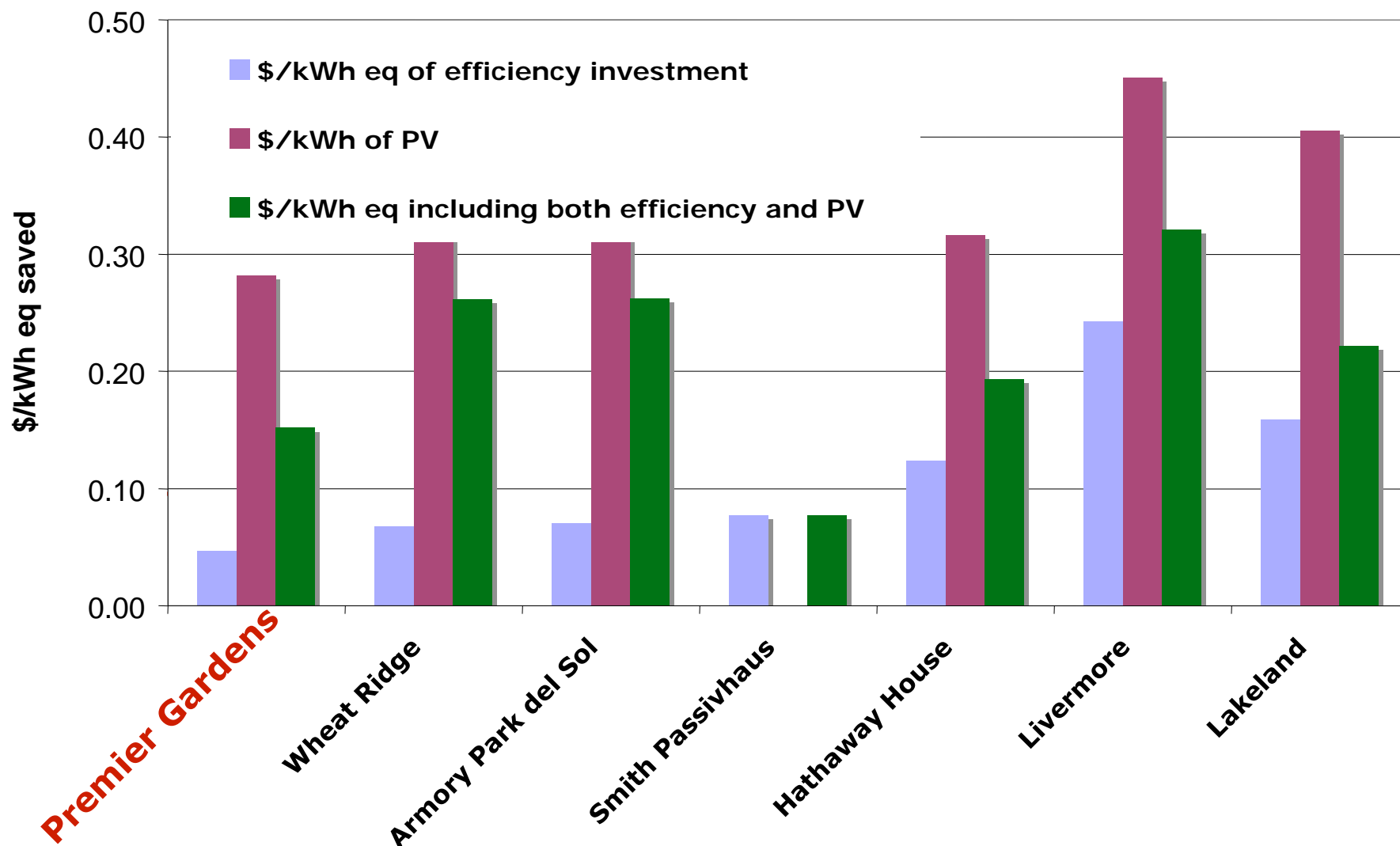
<b>Rated Lumens Range</b>	<b>Maximum rated Wattage</b>	<b>Minimum Rated Life Time</b>	<b>Proposed California Effective Date</b>
1490-2600 Lumens	72 Watts	1,000 hours	Jan, 1, 2011
1050-1489 Lumens	53 Watts	1,000 hours	Jan 1, 2012
750-1049 Lumens	43 Watts	1,000 hours	Jan 1, 2013
310-749 Lumens	29 Watts	1,000 hours	Jan 1, 2013

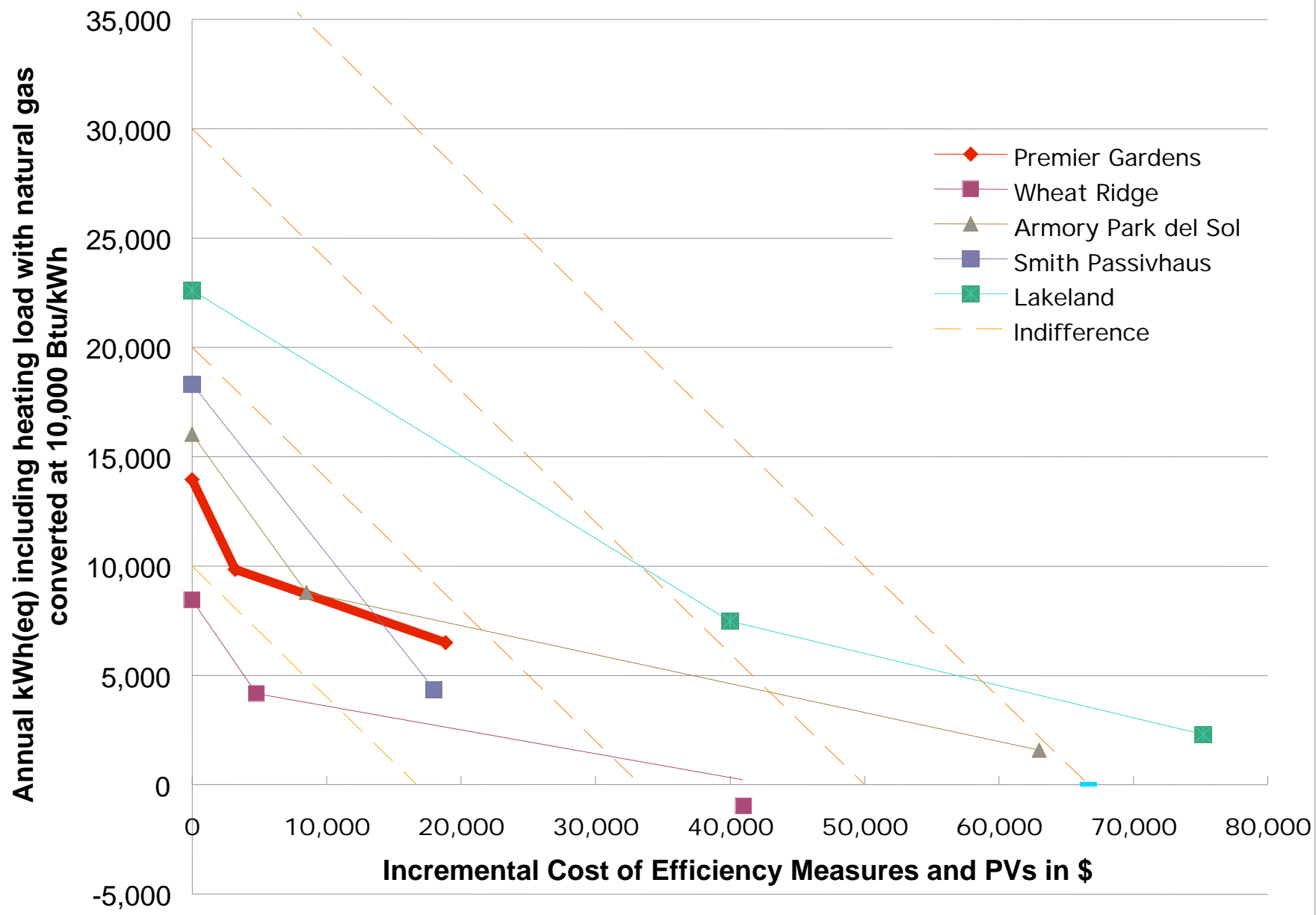
**Proposed Table K-9: Standards for State-regulated General Services Lamps -Tier II**

<b>Lumens Range</b>	<b>Maximum Lamp Efficacy</b>	<b>Minimum Rated Life Time</b>	<b>Proposed California Effective Date</b>
All	45 lumens per watt	1,000 hours	Jan, 1, 2018



- Source for following two Slides:
  - Lester Lave and Maxine Savitz. Relative Costs for 95 new production homes at Premier Gardens in Sacramento.
- Report of Panel on Energy Efficiency in the United States. National Academies Press. (November 2009)  
[WWW.NAS.EDU](http://WWW.NAS.EDU)





- *Published in Climatic Change 2009.*

- **Global Cooling: Increasing World-wide Urban Albedos to Offset CO<sub>2</sub>**

July 28, 2008

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- A First Step In Geo-Engineering Which Saves Money and Has Known Positive Environmental Impacts

1000 ft<sup>2</sup> of a white roof, replacing a dark roof, offset the emission of 10 tonnes of CO<sub>2</sub>

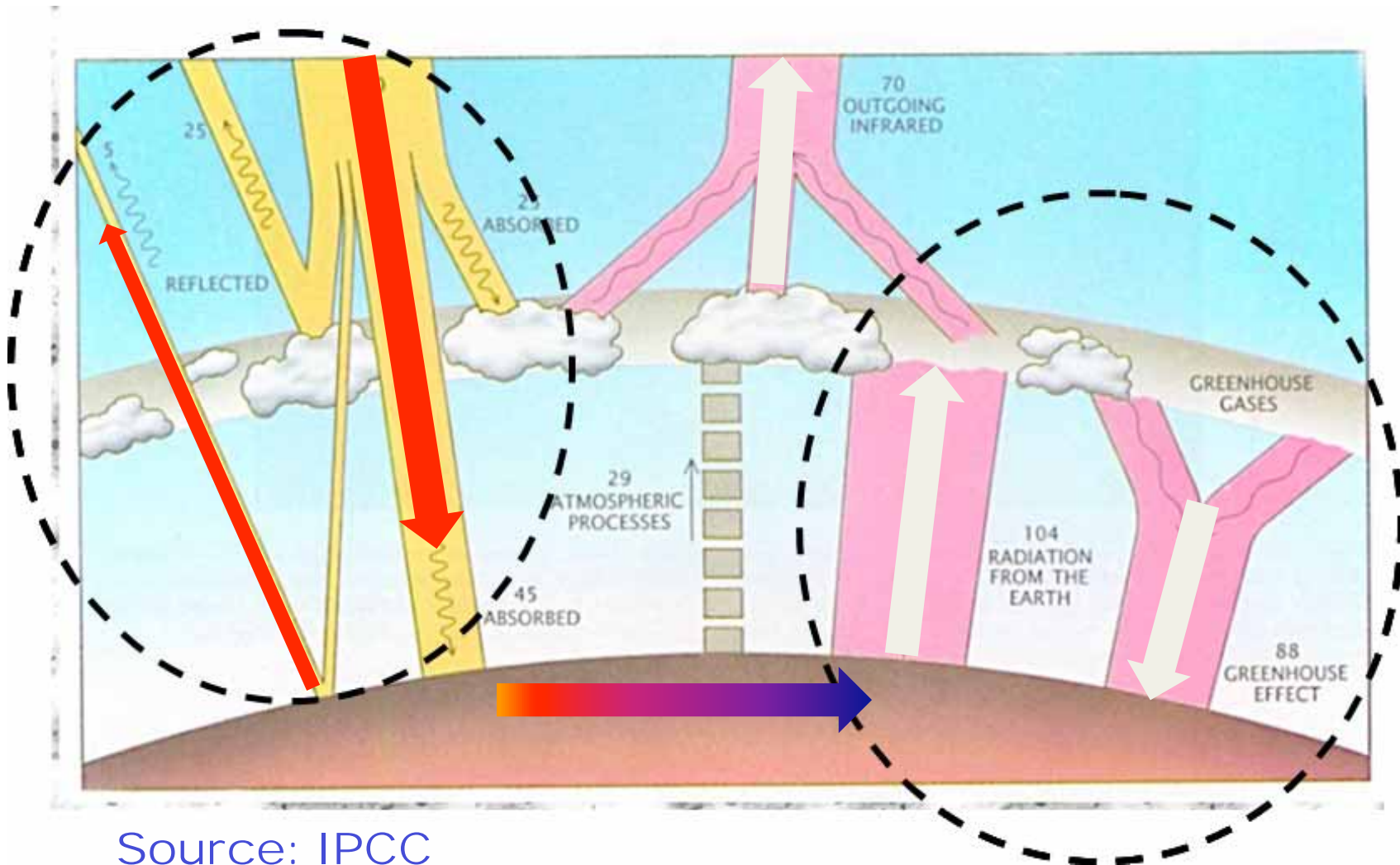


## CO2 Equivalency of Cool Roofs

- White Roofs alone offset 24 GT CO2
- Worth > €600 Billion
- To Convert 24 GT CO2 one time into a rate
- Assume 20 Year Period
- Results in 1.2 GT CO2/year
- Average World Car Emits 4 tCO2/year
- **So rate is 300 Million Cars Off the Road for 20 years.**



# Solar Reflective Surfaces Also Cool the Globe



## White is 'cool' in Bermuda



**and in Santorini, Greece**





# Cool Roof Technologies

Old



flat, white



pitched, white

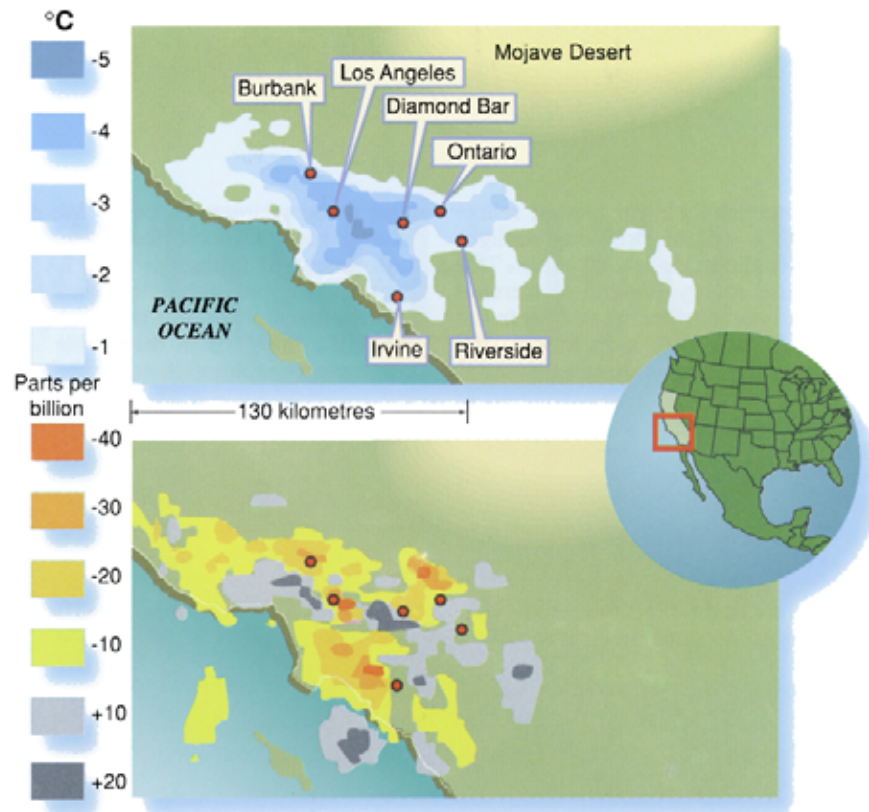
New



pitched, cool & colored

# Simulated Meteorology and Air-quality Impacts in LA

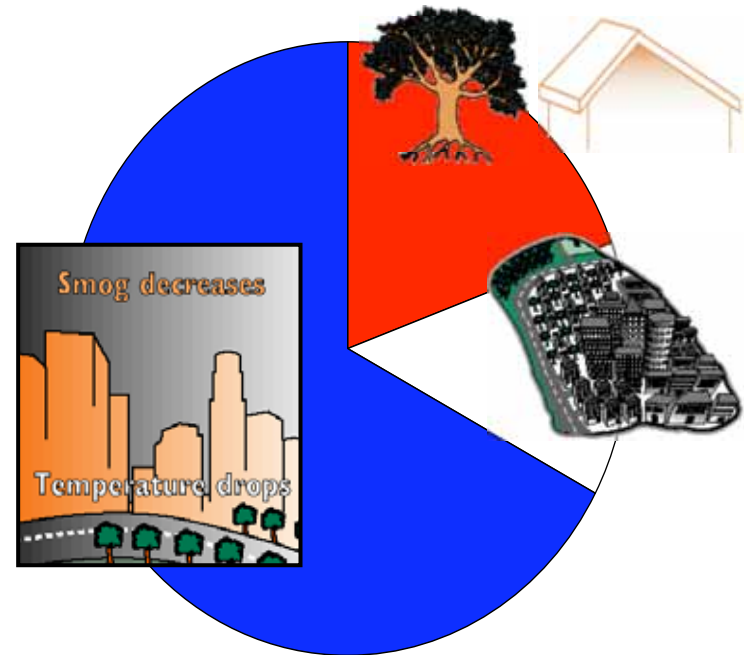
Temperature  
Change



Ozone  
Concentration  
Change

## Potential Savings in LA

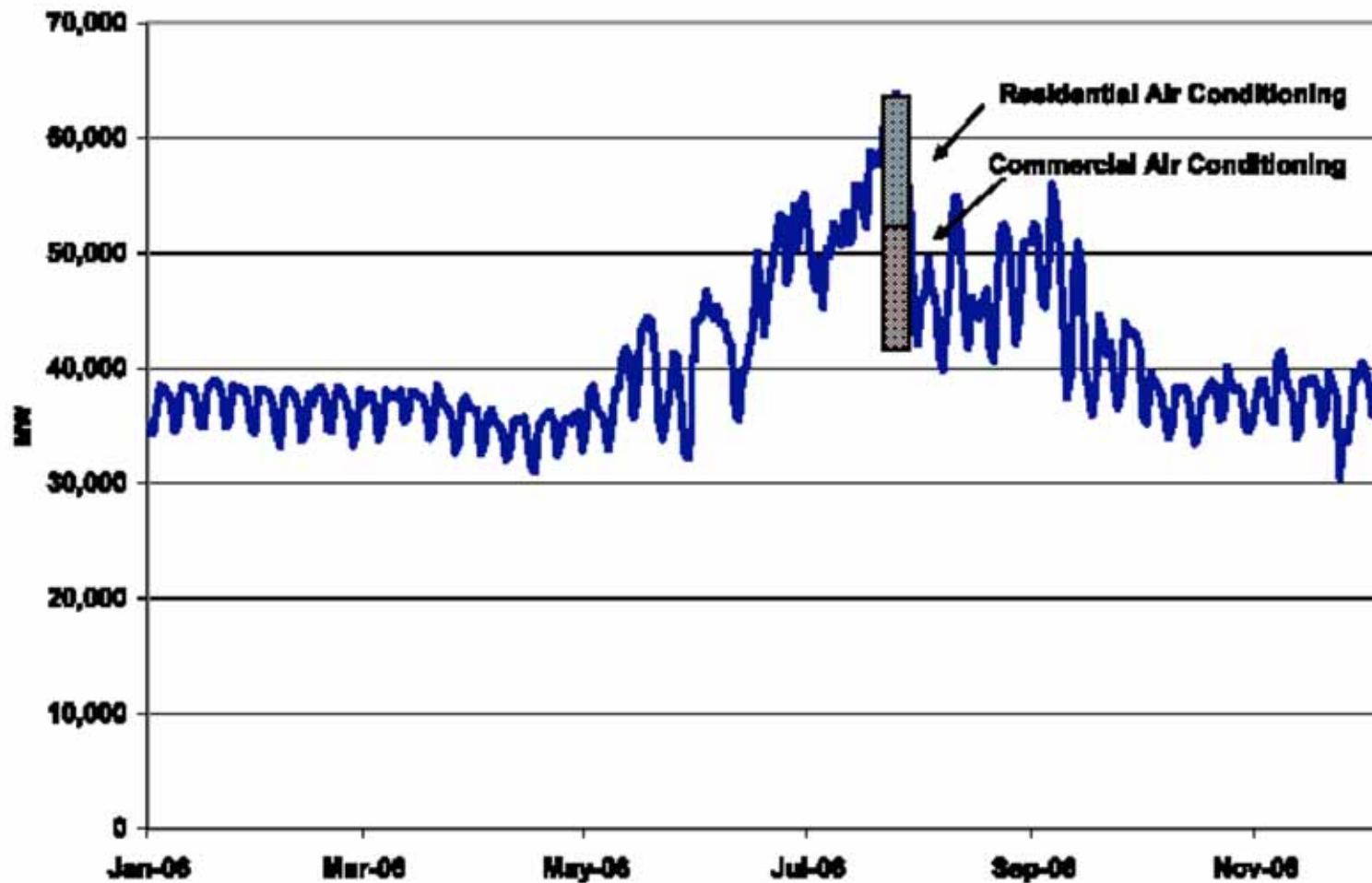
- **Savings for Los Angeles**
  - Direct, \$100M/year
  - Indirect, \$70M/year
  - Smog, \$360M/year
- **Estimate of national savings: \$5B/year**



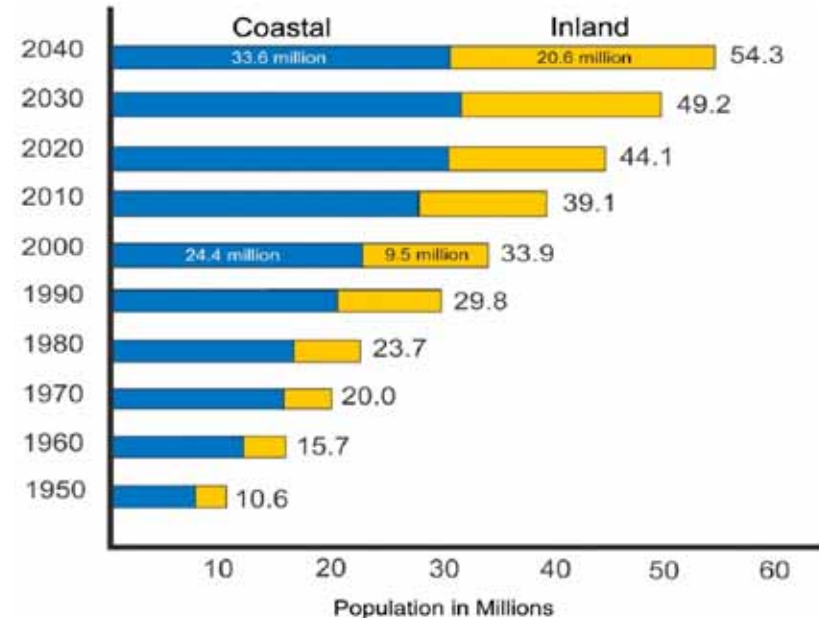
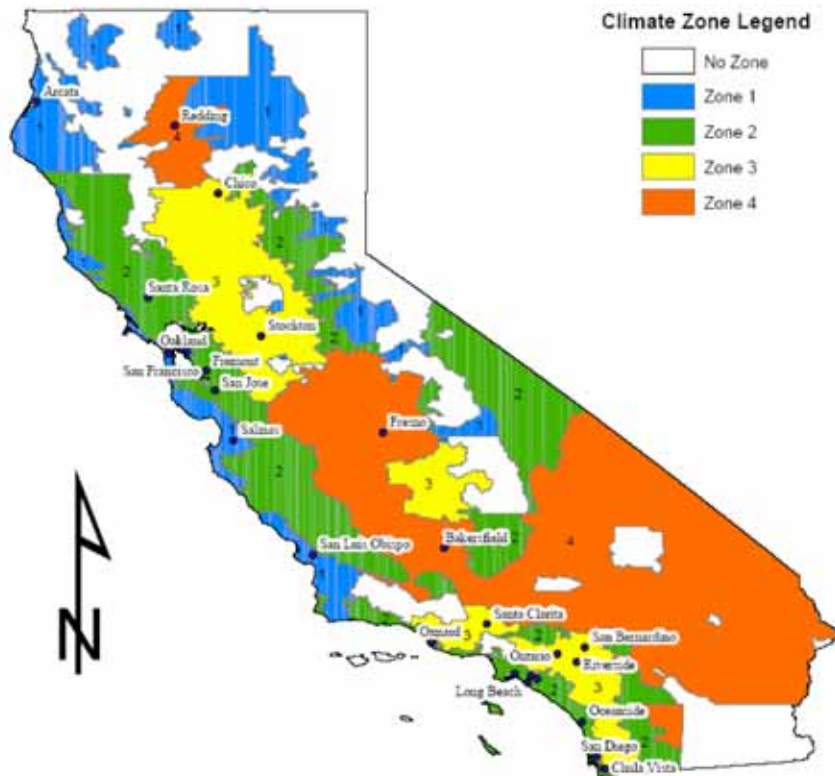


# California is a Summer Peaking Area

California Daily Peak Loads – 2006



# California peak electricity demand is growing



- In 2000, 72% population lived along coast.
- By 2040, nearly 40% of population will live inland.
- Need for more peaking plants or demand response measures to meet the higher summer peaks.

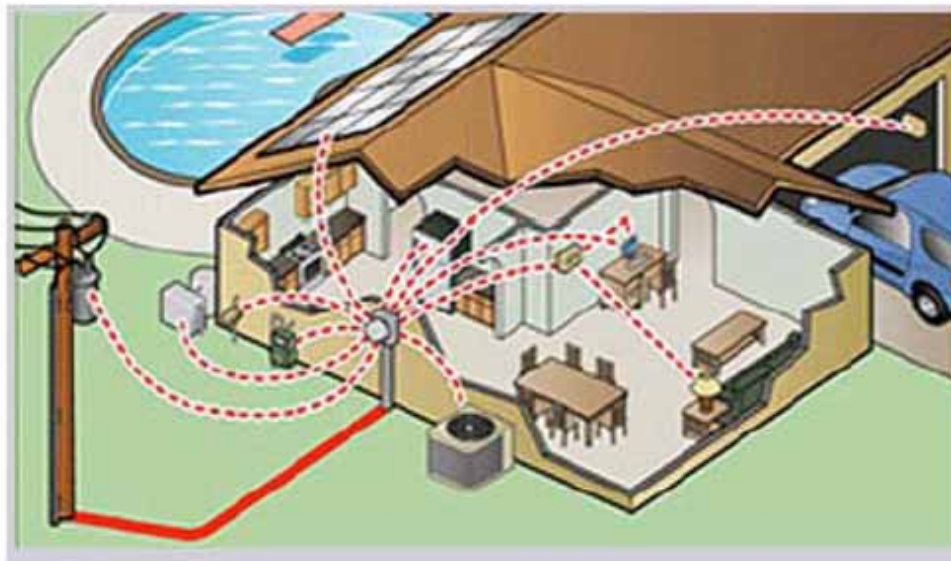
# Three Necessary Components for Demand Response and Utility Modernization

- **Advanced Metering Infrastructure**
  - Digital meters with communication
- **Dynamic Tariffs**
  - Enable customers to be able to respond to hourly prices
  - The structure of these tariffs is critically important as customers are hoping to reduce total energy costs
- **Automated Response Technology at customer locations**
  - Enable residential and small commercial customers to respond to price automatically
  - Larger customers with energy management systems linked to pricing signals over the internet or through other communication channels
- And, when coupled with energy efficiency programs and policies the result can be reduction in total consumption as well as peak period consumption



## What a Smarter Grid Means for Customers

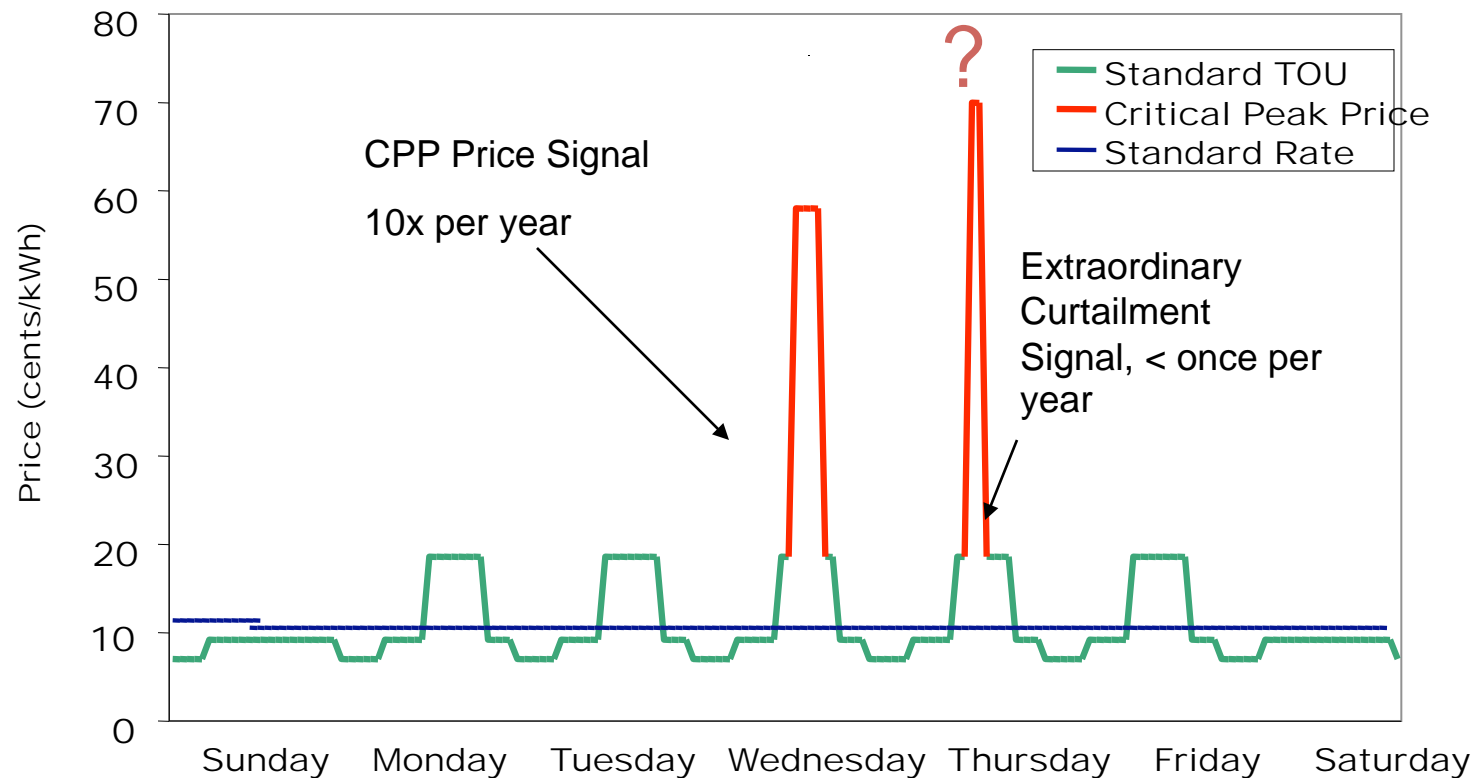
- **Enhanced utility service reliability**
- **More stable, higher-quality electricity supply**
- **Shorter customer outages, faster service restoration**
- **A “self-healing” grid**
- **New Customer program and service options**
- **Increased customer control of energy costs**



# Critical Peak Pricing (CPP) with additional curtailment option

Potential Annual Customer Savings:

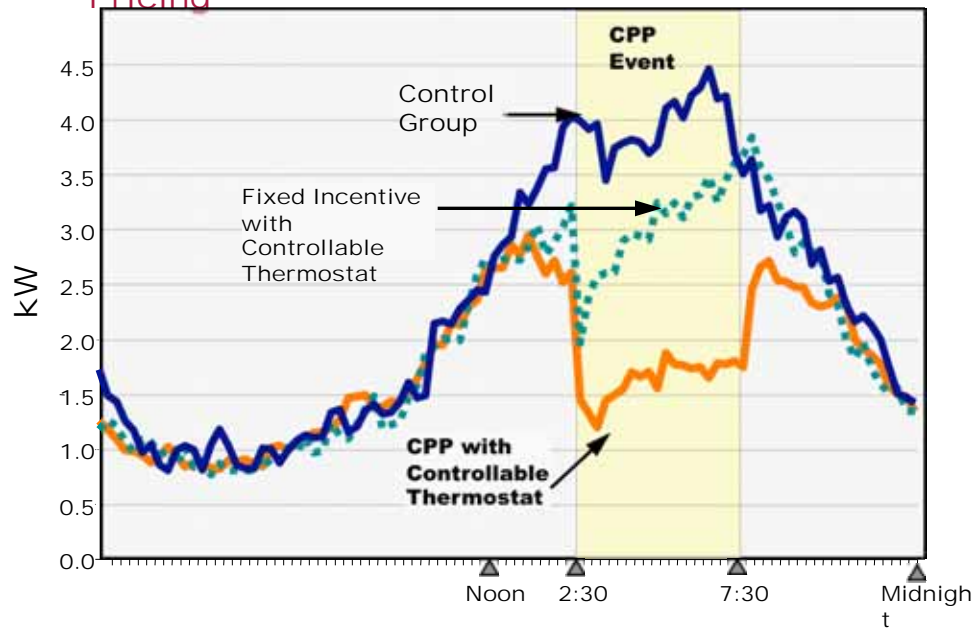
10 afternoons x 4 hours x 1kw = 40 kWh at 70 cents/kWh = ~\$30/year



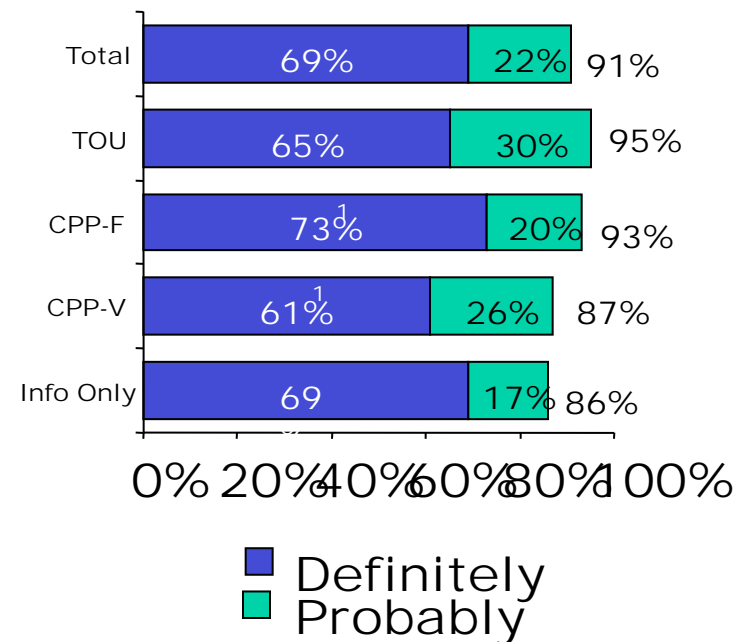
# Key Results from Residential Pilot

- 12% average load reduction for CPP rate alone
- Up to 40% with rate + enabling tech
- Most participants preferred the pilot rates

Average Residential Response to Critical Peak Pricing



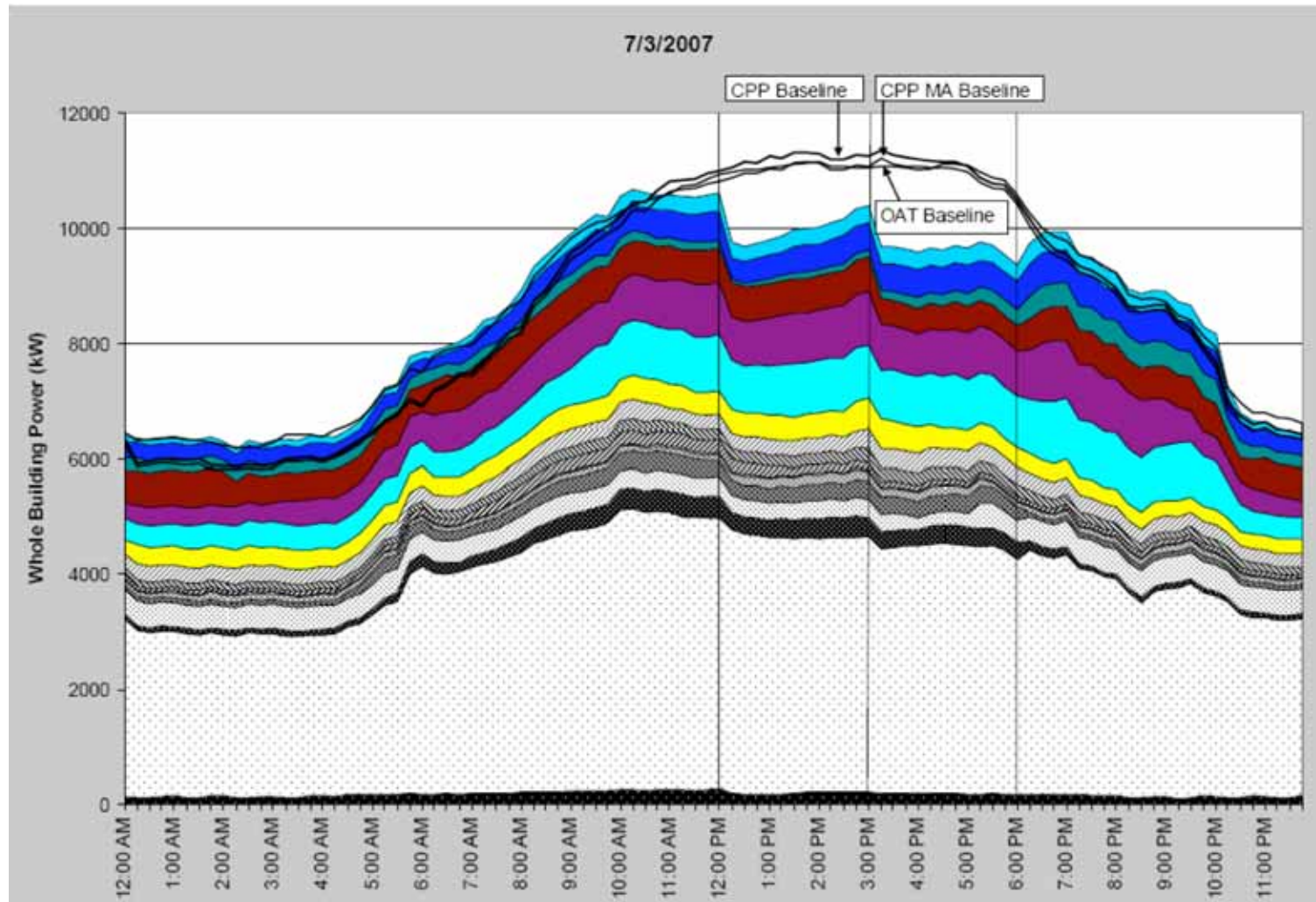
Should dynamic rates be offered to all customers?





# Automated Demand Response

## Commercial Customers



\*Source: Demand Response Research Center, Global Energy Partners

# Federal Property Assessed Clean Energy (PACE) Legislation

- **American Recovery and Reinvestment Act (ARRA)**
  - Included some measures specifically intended to promote PACE programs
- **American Clean Energy and Security Act (ACES)**
  - Authorized federal government to provide guarantees or other indirect financial support to PACE program bonds, potentially reducing the costs of capital to the program dramatically
- **H.R.3525**
  - Introduced by Rep. Mike Thompson in July 2009 (in House Committee on Ways and Means)
  - Allows issuance of federally tax-exempt bonds for PACE programs to finance the following:
    - Renewable energy (solar, wind, geothermal, marine and hydrokinetic renewable energy, incremental hydropower, biomass and landfill gas)
    - Energy conservation/efficiency (energy efficient retrofits of existing buildings and/or efficient storage, distribution, or transmission, including smart grid technologies)
    - Water conservation/efficiency (reduce demand, improve efficiency of use, reduce losses, improve land management practices that conserve water); does not include water storage
    - Zero emission vehicles (no tailpipe emissions, evaporative emissions, or onboard emission-control systems that can deteriorate over time)
    - A facility or project used for the manufacture of the above resources

# Federal PACE Legislation (cont.)

- H.R.3836
  - Introduced by Rep. Steve Israel in October 2009 (in House Committee on Energy and Commerce)
  - Purpose is to promote access to affordable financing and provide credit support for accelerated and widespread deployment of:
    - (1) clean energy technologies;
    - (2) advanced or enabling energy infrastructure technologies; and
    - (3) energy efficiency technologies in residential, commercial, and industrial applications, including end-use efficiency in buildings.
  - Clean energy technology:
    - Technology related to the production, use, transmission, storage, control, or conservation of energy that will contribute to a stabilization of atmospheric greenhouse gas concentrations thorough reduction, avoidance, or sequestration of energy-related emissions and for which, as determined by the Administrator, insufficient commercial lending is available at affordable rates to allow for widespread deployment.
  - “Credit support” is defined as:
    - (A) direct loans, letters of credit, loan guarantees, and insurance products; and
    - (B) the purchase or commitment to purchase, or the sale or commitment to sell, debt instruments (including subordinated securities).

# States with PACE Legislation

• California	AB 811 (2008), AB 474 (2009)
• Colorado	HB 08-1350 (2008)
• Florida	Pre-existing authority to form PACE districts
• Hawaii	Pre-existing authority to form PACE districts
• Illinois	SB 583 (2009)
• Louisiana	SB 224 (2009)
• Maryland	HB 1567(2009)
• Nevada	SB 358 (2009)
• New Mexico	SB 647 (2009)
• New York	S66004a (2009) [same as A40004A]
• Ohio	HB 1 (2009)
• Oklahoma	SB 668 (2009)
• Oregon	HB 2626 (2009)
• Texas	HB 1937 (2009)
• Utah	Pre-existing authority to form PACE districts
• Vermont	H 446 (2009)
• Virginia	SB 1212 (2009)
• Wisconsin	AB 255 (2009)

# The End

For More Information:

[http://www.energy.ca.gov/commissioners/rosenfeld\\_docs/index.html](http://www.energy.ca.gov/commissioners/rosenfeld_docs/index.html)

or just Google “Art Rosenfeld”

